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ANIMAL KINGDOM

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ANIMAL KINGDOM

Bulletin of the New York Zoological Society

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Attitudes Toward Animals

SOME DAY a book should be written on the varying attitudes of peoples of different countries toward animals, tracing the cultural influences that are responsible for them.

If one starts with the premise that, on the average, human beings the world over have similar innate qualities, that goodness and kindness on the one hand and badness and cruelty on the other, are largely the consequences of cultural environment, it is remarkable to note the wide variations that exist in the relationship between man and other living things.

Many examples could be given that suggest some of the illogical and contrasting patterns of human behavior toward our fellow creatures. Religion sometimes plays a curious part. In the Moslem world it is wrong to take the life of an animal. This benevolent concept leads to consequences that, in our eyes, entail needless suffering and cruelty, as when domestic animals, too old for usefulness, are allowed to starve to death. The painful experience of finding song-birds in a bird-shop in Naples deliberately blinded in the illusion they "sing better" if sightless is not easily forgotten. Yet such cruelty is a cultural result, not innately a racial characteristic — a number of the most gentle and competent of our animal-keepers in our own Zoological Park are of Italian ancestry. An anomaly is presented by the British, as well as by Americans, in that hunting, shooting and "blood-sports" are an accepted part of recreation, yet there is wide-spread popular support of humane organizations for the care and prevention of cruelty to animals and of anti-vivisection leagues.

One will ask, of course, "What of man's inhumanity to man?" Perhaps kindness to other living things, including peace among men, is all of a piece. As we learn to treat each other better, we may in turn improve in our treatment and protection of animals. They, at least, have no redress and no defense if we do not.

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The Prevention and Treatment of Snakebite

By JAMES A. OLIVER

WITH THE ARRIVAL of another summer vacation season, fishing gear and camping equipment are being dusted off and readied for use. Plans are being made for an exciting canoe trip through the northern woods, for a summer at one of the dude ranches in the far west, for a weekend hike along one of the timbered trails in the Smokies, or for a one-day visit to Bear Mountain Park. Millions of Americans are poised for their annual excursions into the Great Outdoors. This is the traditional season for communing with nature — for renewing outdoors our mental and physical vigor that has been nearly expended by sedentary, indoor living of the past winter. The overall benefit of outdoor activities is beyond measure and repays the cost many times over.

To obtain the full benefit from vacation excursions we must avoid the hazards that may be encountered. Most of these hazards consist of minor annoyances, such as sunburn, ivy-poisoning, insect bites and stings, but others are more serious and may actually result in loss of life. One of this latter group is the hazard of venomous snakebite, unfortunately often exaggerated in importance. In the minds of many people, all snakes are deadly and the out-of-doors abounds with snakes lurking to pounce on the unwary.

This belief is a fantasy, an exaggeration lying far from the truth. In the first place, venomous snakes are definitely in the minority. Of the approximately 250 different snakes known in the United States, only fifteen percent. are venomous, and only a few of these can be considered deadly. Secondly, there are few localities in this country where snakes are at all common. In fact, most people rarely see a snake in the wild, but because of their fear of snakes, the number seen and reported is unconciously increased. Thirdly, virtually all snakes will keep out of man's way if given a chance.

These basic considerations attest that the popular concept of the importance of snakebite as an outdoor hazard is greatly exaggerated. Its relative unimportance also is reflected by the difficulty of obtaining reliable statistics. Figures are published from time to time, but it is virtually impossible to evaluate their accuracy. Some people undoubtedly are bitten by snakes and do not report it because they live in remote regions, while false reports are contributed by excitable persons who are stung by insects, encounter stinging nettle or merely get scratched in the woods. The Antivenin Institute of America endeavored to compile a record of the number of persons bitten in the United States for the years 1928 and 1929, and the results have been summarized and analyzed by Dr. R. H. Hutchison. He obtained reports of five hundred to six hundred bites per year, which he estimated to represent about a third of the total actually occurring. Thus, on the basis of his calculations, between 1,500 and 1,800 persons were bitten by venomous snakes in the United States in each of the years 1928 and 1929. The mortality rate was slightly more than five percent., indicating an annual mortality due to venomous snakebite of not more

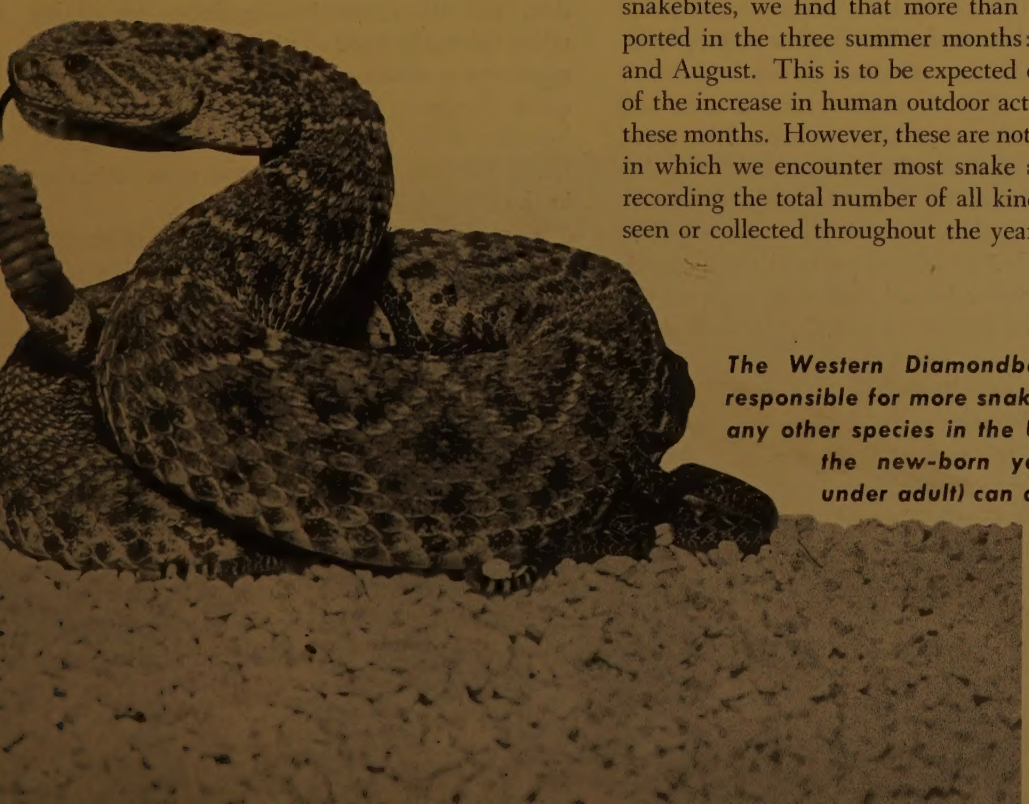
than one hundred persons. These are conservative figures and are probably considerably in excess of the actual number of bites. By way of comparison with one of the more prosaic causes of death, figures indicate that more people are killed by lightning than by venomous snakes. Mr. Graham Netting, the herpetologist of the Carnegie Museum in Pittsburgh, has pointed out that in the United States far more people are injured and killed by accidents in the bathtub than are involved in bites by venomous snakes. He concludes that "many more persons suffer from snake fright than from snakebite".

Since no figures later than 1929 are available for the entire United States, it is impossible to determine whether the number of bites is increasing or decreasing. Mr. E. Ross Allen has compiled figures on the number of snakebites in Florida alone from 1934 to the end of 1951, but they do not clearly indicate the trend. The number of bites reported for 1948 is well above the average number for the total period 1934 to 1948, but is very similar to the number reported in 1935. A slight increase might be expected from an increase in communication and transportation facilities, but on the other hand, a decrease would be indicated by fuller land utilization and human activities that would indirectly reduce the number of venomous snakes in the state.

It is interesting to note that the percentage of mortality resulting from snakebite in Florida appears to be three times more than that reported for the United States as a whole, averaging approximately fifteen percent. over a fourteen-year period. This higher figure results from the fact that often more than half of the bites reported annually in the state are by the large and deadly Eastern Diamondback Rattlesnake (*Crotalus adamanteus*). Of the seventy-six deaths reported from snakebite in Florida over the fourteen-year period, seventy-one were the result of bites by this snake.

Throughout the United States, the Copperhead (*Agkistrodon contortrix* subspecies) is responsible for the greatest number of bites reported, with more than a fourth of all bites being by this snake. However, there is *no* record of a fatality attributable to this species. The snake responsible for the greatest number of deaths in the United States is the Western Diamondback Rattlesnake (*Crotalus atrox*) of the southwestern United States and Mexico. For those living in the northeastern states, it is comforting to know that less than a fourth of the snakebite fatalities reported in 1928 and 1929 occurred east of the Mississippi River and north of the Mason-Dixon Line.

If we examine the seasonal occurrence of snakebites, we find that more than half are reported in the three summer months: June, July and August. This is to be expected on the basis of the increase in human outdoor activity during these months. However, these are not the months in which we encounter most snake activity. By recording the total number of all kinds of snakes seen or collected throughout the year in a given



The Western Diamondback Rattlesnake is responsible for more snakebite fatalities than any other species in the United States. Even the new-born young (at left, and under adult) can deliver a lethal bite.

A pit viper's skull, showing the large, hollow fangs with their replacements just behind. The short teeth on the upper and lower jaws are not part of the venom apparatus.

locality in the northeastern United States, we find that more than forty percent. are reported during one month, either April or May. Following this peak of spring activity the total drops off markedly, reaching a minimum in late August or early September. There is a slight increase again in the numbers seen in late September and early October, followed by a sharp decrease as the snakes go into winter hibernation.

Thus the seasonal incidence of all snakes seen is very different from the seasonal occurrence of snakebites. Why? Is the seasonal occurrence of bites due solely to the fact that more people are out in the summer months? If this is the only factor, then why aren't more snakes seen and collected at that time also? It should be noted that in talking about the total number of snakes seen or collected we are combining records for all species together. But are all snakes active at the same time? If we compare the same records mentioned above for all snakes throughout the year with the figures for the Copperhead alone, we find that a maximum number of Copperheads will be seen or collected in the months of June, July and August, with a secondary peak in October. The seasonal incidence of the Copperhead follows a pattern very similar to that for the seasonal distribution of snakebites in the United States. The fact that the Copperhead is responsible for such a large number of bites may be part of the explanation of this similarity. However, the increase in human activity outdoors at the same time is also a contributing factor.

Throughout the world there are many different kinds of snakes that possess a toxic venom. These differ in a number of important features, including details of their venom and venom-injecting structures. It is well to point out here that contrary to popular belief, the tongue of snakes is soft and harmless, playing no part in biting. In some venomous snakes the rearmost teeth in the upper jaw may be enlarged and grooved on the side, with the venom flowing down this groove when the snake bites. This type of development represents a rather crude method and usually requires the snake to chew on the victim to insure injection of the venom. Few of these rear-fanged snakes are dangerous to man and none occurring in the United States is so considered.

The other main type of development of venom-injecting apparatus is possessed by snakes with an enlarged, hollow fang on each side in the front of the upper jaw. When one of these snakes bites, the venom is injected through the hollow, hypodermic-like fangs. This is a much more efficient device for the injection of venom. The front-fanged venomous snakes can be divided into two groups on the basis of whether the fangs are virtually immovable in the upper jaw or whether they are freely movable. In snakes with nearly immovable fangs, these teeth are usually short and the mouth can be closed with the fangs in the erect position. To this group belong such

well-known venomous snakes as the Cobras, the Mambas and the Coral Snakes. The latter are the only representatives found in the United States.

Snakes with movable front fangs include the True Vipers of the Old World and the Pit Vipers of both the Old and New Worlds. All of our venomous snakes in the United States, with the exception of the Coral Snakes, belong in this group. When not in use, the fangs are folded against the roof of the mouth, but they can be quickly erected for striking. Usually they are longer than the immovable fangs.

The fangs are shed periodically, but the new one moves into place beside the old one before the latter is shed. Thus a snake may have two fangs in place on one side for a short time. Immediately behind the functional fangs on each side there is a graded series of replacements. If the functional fangs are accidentally broken off or pulled out, it is a matter of only a few days until a replacement moves into place.

There is a venom gland on each side of the head just back of the eye, and each is connected to a fang by the venom duct. Contraction of the muscles surrounding the glands forces the venom out of the gland, through the venom duct and out through the fang. Some of the Cobras of Africa and Asia have further modified this venom apparatus and can eject or "spit" the venom. None of the snakes in the United States have this ability, although when an infuriated snake strikes short of its target, some venom may be thrown out for a short distance. Even though it hits bare skin, such venom will do no harm unless it enters a scratch, a sore or the eyes.

All our venomous snakes, except the Coral Snake, characteristically strike from a coiled position with the anterior part of the body immediately behind the head forming one or more S-shaped loops. This position enables the snake to lunge out at an adversary before it comes in contact with the snake's body. Usually the snake does not strike more than a third to a half its total length and does not leave the ground when it strikes. Some of the rattlesnakes when thoroughly aroused may strike so vigorously as to cover a distance approximating their own length and the body may actually leave the ground an inch or two. A strike of this force is unusual.

A question frequently asked is whether or not a snake can strike without coiling. The catch in this question is the word "strike." I think most inquirers intend to ask whether or not a snake can *bite* without coiling. The answer is that a snake can bite at any time, from any position, but that unless the snake is in at least a partial coil, it cannot move the head very far to hit an object. Another matter about which there is a good deal of misunderstanding is a snake's ability to bite under water. This is a double query: can it bite under water; and, if it can, will the venom be diluted by the water? The answer is that a snake can and will bite as effectively under water as on land, but the distance that it can

The Cottonmouth Moccasin can bite under water just as effectively as on dry land. Snakeproof boots will give protection in the water.

strike is reduced by the resistance of the water. Because of the hypodermic-like apparatus by which the venom is injected, the effects of the venom will be as severe as in a bite on land.

Coral Snakes differ from other venomous snakes of the United States in that their defensive position is often with the body loosely arranged in two or three irregular loops, and the head lowered at the end of one of the loops. In striking the head loop is lashed from side to side in quick, jerky movements. Thus the snake appears to slash sidewise rather than to stab out from the body position.

Striking and biting are so quick that there is disagreement as to whether snakes like the rattlers actually bite or whether they stab when they strike. Photographs taken with stroboscopic light leave little doubt that the initial movement involves an outward stabbing motion. But when the snake hits the object at which it is striking does it merely stab with the erected fangs and withdraw them, or does it quickly bite and withdraw? Does it stab under one set of circumstances and bite under another? There is no conclusive answer to these questions at the present time. In the photographs of a rattlesnake striking that accompany this article, it certainly appears to be biting rather than stabbing. Most of the evidence indicates that in the rattlesnakes, at least, the typical strike involves a bite rather than a stab. This question is of importance in relation to the use of the teethmarks in diagnosing a venomous snakebite, as mentioned below.

What preventive measures can we take to reduce the risk of being bitten by a venomous snake? In order to answer this question it is instructive to analyze the bites reported by Hutchison. In more than a thousand bites, he found that fifty-seven percent. were inflicted on the legs. Of the bites on the legs, forty percent. were on the foot, twenty-nine percent. were on the ankle, twenty-nine percent. on the shin, and the remaining two percent. on the thigh. Forty-two percent. of all the recorded bites occurred on the arms, with fifty percent. of these being on the fingers, thirty-one percent. occurring on the hand, eight percent. on the wrist, ten percent. on the forearm and the remaining one percent. on the upper arm. Out of all the bites recorded, less than one percent. occurred on the head and trunk. Equally instructive are the circumstances under which the bites occurred. Where this information was recorded, sixty-three percent. of the bites resulted from stepping on or too near a venomous snake, twenty-seven percent. occurred while picking up objects, six percent. while catching or handling snakes, three percent. while reaching into or under something, and one percent. while sleeping outdoors.

From this analysis we get a number of indications as to what preventive measures will be most effective. As far as proper preventive measures for the individual are concerned, they include protective clothing and common sense habits.

This Eastern Diamondback Rattlesnake is striking for a distance of about one-third its length—the usual range of such attacks.

Here the snake has actually nected with the boot, and a of venom can be seen just b the white sheath of the fa

Varying degrees of protection are afforded by clothing. LEFT: A rolled pants leg may be comfortable, but it leaves the leg open to attack. Better keep the cloth rolled down. CENTER: Snakebite-proof boots are real protection. RIGHT: Best of all is to wear snakebite-proof boots AND rolled-down pants leg.

Protective clothing is practical only for the lower legs, but since more than half of all bites occur in this region of the body, it is quite important.

Any covering of the legs is better than going barefooted and barelegged. However, the thicker the covering, the greater the protection. Thus leather shoes give more protection than canvas "sneakers." Long trouser legs give more protection than bare legs because the snake's fangs may be caught in the cloth or the cloth may deflect the strike. In areas where venomous snakes may occur the trouser legs should not be rolled up to the knees, as is done by many young people.

High leather boots or heavy leather shoes with leather puttees give good protection against the bites of all but the largest venomous snakes. An additional measure of protection is obtained by wearing the trouser legs outside of the boots or puttees instead of tucking them in. The only complete protection for the lower leg against the bites of all of our venomous snakes is obtained by wearing thick, snakeproof boots. Such boots have long been manufactured by the Gokey Company of St. Paul, Minnesota. These boots have been tested successfully many times against the bites of our largest venomous snakes. Although made of extra heavy bull hide, this boot is soft and comfortable to wear. Through the courtesy of the Gokey Company their snakeproof boots were used in making the photographs of snakes striking for this article.

Of the bites occurring on the legs, ninety-eight percent. were inflicted below the knee. The wearing of snakeproof boots would prevent these bites. The possibility of a bite being inflicted on the thigh is too remote to justify the wearing of awkward and bulky protective covering on the thighs. Such rare occurrences can largely be avoided by developing protective habits.

The simple principle in all the protective habits is to avoid putting any part of one's body within the striking range of a venomous snake. If this basic rule is kept in mind at all times when outdoors, the risk of being bitten can be greatly reduced. It is impossible to cover every situation that may be encountered in the woods, but the commonest mistakes that lead to snakebite accidents are discussed briefly in the legends of the "Do-Don't" photographs in this article. If these warnings are taken to heart, they should materially reduce not only snakebite accidents but many other kinds of outdoors mishaps as well.

DON'T sit down without taking a careful look at the object you're going to sit on. There are several cases on record of persons actually sitting down on venomous snakes.

DO make sure that even if there is no snake directly on th spot where you are going to sit, there is nothing lurkin under the object or hidden alongside or under the surrounding debri

DON'T blithely step over a log or rock or other such obstruction in the woods without making sure what's behind. You might step on or alongside a venomous snake.

DO step up on the log first. It takes only a fraction of a second to glance down as you step up, and then you can be sure it's safe. You should try to make caution a habit when in the woods.

DON'T turn up boards and chunks of wood AWAY from you, as in this picture. If a snake happens to be underneath, it can strike at your feet while you are still lifting.

DO stand behind the object you are going to pick up, and pull it TOWARD you. By that simple precaution, you have put some sort of a barrier between your legs and whatever is beneath

DON'T put your fingers in or around the mouth of a freshly-killed snake. Reptiles have prolonged reflex actions. People have actually been bitten by quite-dead snakes.

DO use a stick (and a long one, too) for probing around the head of a dead snake. A stick is just as convenient, if you are looking for fangs or facial pit — and a lot more sanitary!

DON'T put your hand (especially while climbing) on a rock ledge or rock wall unless you can see all around the spot and can be sure there isn't a snake just out of sight.

DO look before you reach. Rock ledges are a favorite denning place for Rattlesnakes and Copperheads and in the early spring or fall you are likely to find them sunning in the crevices.

DON'T pick up chunks of firewood or boards by putting your fingers under them. A rubber "hand" is used in this picture to show how close you might be to real trouble.

DO pick up objects by grasping them at the ends or side Look first and grasp firmly later. How do you know what underneath? Many snakes seek shelter under logs and similar debr

And, furthermore, when you're in the woods - -

DON'T	DO
DON'T put your hands in hollow logs or down holes. They're excellent shelter for snakes and you might put your hand on one.	DO investigate such places with a long stick, if you really have to investigate. Prod gently and you can soon tell if there's anything there.
DON'T handle or play with venomous snakes. In 1929 alone, 26 persons were bitten while catching or handling venomous snakes.	DO learn to recognize the venomous snakes of your region. If you want to handle snakes, be sure they belong to the species that are safe.
DON'T camp where there are brush piles, rock piles, wood litter and the like. Those spots frequently shelter snakes and their prey.	DO find a clean area for your camp, or clean up the site. You'll be more comfortable, and you won't be running a quite unnecessary risk.
DON'T gather firewood at night, because even with a good light you can't always see all around where you are putting your hands.	DO estimate your firewood needs in advance and lay up a sufficient supply during the daylight hours. It's just ordinary common sense.
DON'T walk right next to a rock ledge or rock wall. Snakes may be resting in the crevices well above your protective covering.	DO keep several feet away from rock walls and ledges. If that isn't possible, the least you can do is to move cautiously and look around.
DON'T sleep on the ground in areas where venomous snakes occur if you can possibly avoid it. As the temperature drops at night, snakes seek shelter and may be attracted by the warmth of your body. You won't like it.	DO sleep in a hammock or on a cot, if you can, for venomous snakes rarely climb off the ground. If you must sleep on the ground, choose a spot free from brush. Incidentally, a horsehair rope doesn't stop any kind of snake.

Portrait of a boy looking for trouble.

In the event that a venomous snakebite does occur, what is the proper method of treating it? Unfortunately, there is considerable disagreement on this topic. This is partly a reflection of the relative unimportance of snakebite from a medical standpoint, and is also due in part to the great number of variable conditions involved in each individual snakebite. The seriousness of a bite may be influenced by many factors — the physical condition of the individual bitten; the part of the body on which the bite is inflicted; the type of bite; the size and species of the snake (which will have some bearing on the depth of the bite and the amount of venom injected); and, finally, the physical condition of the snake. It is beyond the scope of this article to elaborate on these variables, but they will determine the outcome and results of the bite. Despite the existing disagreement about the details of treatment, it is certain that the immediate application of first aid measures is important in limiting the effects of the venom. And here a word of warning should be given: apply first aid treatment with care and forethought, or else the tourniquet, the incisions or an antivenin reaction may be as painful as the effects of the venom.

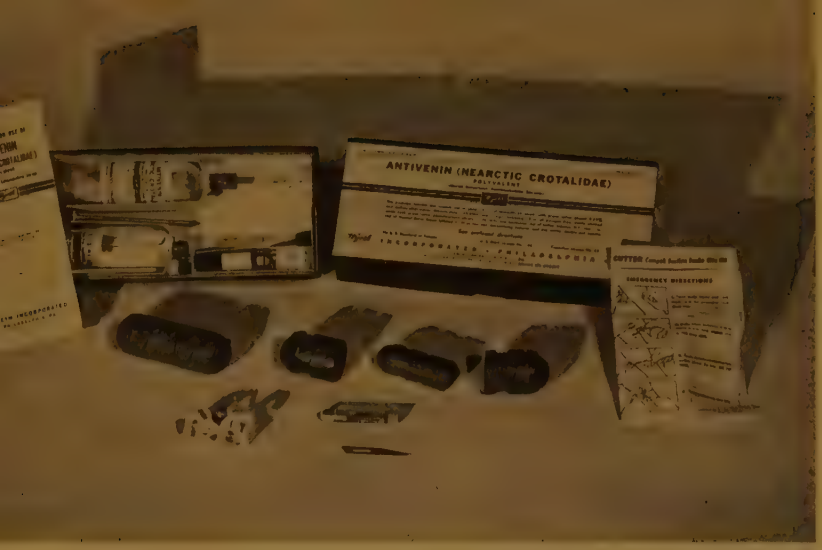
If one is bitten by a venomous snake, first aid treatment should be started *immediately*, and *calmly*, not hysterically. First apply a constricting band around the bitten limb just above the site of the bite, so that the band is between the bitten area and the body. This constricting band, the tourniquet, *must not* be applied so tightly that it stops the circulation. Its purpose is to slow, not stop, the circulation; therefore, it should only constrict the limb slightly. There is a very real danger in putting the tourniquet on too tightly and in leaving it on too long when tight. The consequences of this may actually be worse than the effects of the venom. To guard against this possibility, first aid instructions state that the tourniquet should be completely released for a minute every ten or fifteen minutes.

Next, make several short incisions in the vicinity of the bite. These incisions should be between one-half and three-quarters of an inch in length. The depth to which the cut is made will be determined by the location of the bite. A deep cut cannot be made on the fingers or toes without the risk of damaging a blood vessel, nerve or tendon. Therefore, incisions made on the finger or toes must not be too deep until swelling occurs. A deeper cut can be made parallel to the long axis of the limb, finger or toe. This will serve also to reduce the risk of cutting a vessel, nerve or tendon. The purpose of the incisions is to permit drainage and removal of the blood fluid and lymph that has become mixed with the venom in the vicinity of the bite. As swelling occurs and moves up the limb, additional incisions should be made in the newly swollen portions. This procedure will result in a number of small incisions over the swollen area of the bitten limb.

To facilitate and speed up the removal of the venom-contaminated body fluids, suction should

DON'T make incisions across the limb, as here. And this tourniquet is much too tight, so that it cuts off the supply of blood.

DO make incisions this way—the long way of the limb. Note how suction cups are applied; also that the tourniquet is not tight.



These are antivenin and suction kits, compact and easily carried in the field. Dark objects in the foreground are suction cups, shown as they appear both packed and open ready for use. A tube of antiseptic solution, a knife and a tourniquet fit inside the cups.

be applied to the incisions. If no other means of suction is available, this can be done by sucking with the mouth providing the individual does not have any open sores on the lips or in the mouth. It is far better and safer to use small rubber suction cups for this purpose. Virtually all the snakebite first aid kits now sold on the market include some type of suction device. It is advisable to purchase one of the kits that includes more than one suction piece. If the rubber suction cups are used, several of these can be applied to different incisions at the same time, thus making the drainage more effective.

The effectiveness of the incision-and-suction technique has been questioned by some herpetologists, on the grounds that the venom mixes immediately with the blood serum, lymph and body tissues and at the present time there is no effective means of separating them. Despite this fact, it has been shown experimentally that in the case of a bite by a rattlesnake enough toxic material (the mixture of venom and body fluid) can be removed by incision and suction to kill a second experimental subject. This impresses me as being sufficient proof of the effectiveness of this method in treating bites inflicted by our North American Pit Vipers.

Suction should be continued until the swelling stops spreading. This may be anywhere from five to fifteen hours, depending upon the seriousness of the bite. Suction may be interrupted briefly for rest periods during which time the limb should be covered with cloth packs saturated with strong table salt or Epsom salt solutions. If prolonged suction is required, the attending physician should give blood transfusions as needed.

An antivenin serum for snakebite in the United States is manufactured by Wyeth, Inc., Philadelphia 3, Penn. This serum is prepared to counteract or neutralize the venoms of the North American Pit Vipers which primarily affect the blood, but not for use against the bite of the Coral Snake whose venom affects the nerves. It is manufactured from horse serum that has been immunized against the venoms of a number of different North American Pit Vipers, and must be used with care because of the sensitivity of some people to horse serum. Each package of this antivenin is provided with a small vial of normal horse serum to be used for testing the individual's sensitivity and for desensitization in case of marked sensitivity. However, unless the bite is very severe or much time will lapse before getting to a doctor, it is advisable to have the antivenin injected by a physician. When there is no history or evidence by test of marked sensitivity to horse serum, the antivenin may result in considerable relief and improvement.

Anyone going hunting or camping in remote regions where venomous snakes may be encountered would be wise to take serum with him and be prepared to administer it himself. In the case of a severe bite by a large snake, as many as five tubes of serum may be required. In most cases the antivenin is injected intramuscularly or subcutaneously, with about half of the initial dose being put in at the site of the wound and the remainder being injected higher up on the limb or on the trunk. In severe bites intravenous injection by a doctor may be required.

Because the effects of the venom vary inversely with the bulk of the body, children will require a larger amount of antivenin than adults. This variation in relation to the bulk of the body is due to the relative amounts of body fluids and the resulting body resistance to the venom.

Such are the specific first aid measures that should be taken promptly in case of a bite by a venomous snake. These steps include the three basic ways of combating the effects of venom: restricting its spread (tourniquet), removing it (suction), and neutralizing it (antivenin). If a perfect method were available to accomplish any one of the three, the other two would, of course, be unnecessary. In the present state of our knowledge, all three should be used together and the sooner they are applied, the better. These remarks are applicable for the bite of any venomous snake in the United States except the Coral Snake, for which no specific antivenin has as yet been manufactured. In the very rare cases of bites by this snake, the first aid measures of tourniquet, incision and suction should be employed, although they are not as effective as against Pit Viper venom. In all cases it is important to get to a doctor as quickly as possible without undue exertion on the part of the person bitten. There are a number of additional steps that can be taken by the physician to augment the individual's bodily resistance to the venom and to relieve discomfort. This includes infusions of large quantities of physiological salt solutions, blood transfusions and the administration of sedatives and stimulants as required. Use of the drug ACTH (Cortisone) has been recommended and employed in the treatment of snakebites, but its value has not been sufficiently analyzed as yet.

A few "don'ts" should be mentioned here. *Don't* run, walk or make any physical exertion except as absolutely required to obtain first aid and medical attention. If you are alone in the woods at some distance from help when bitten, begin the first aid treatment and continue it as you *walk* to get assistance. *Don't* cauterize or rub or inject potassium permanganate into the wound. Potassium permanganate will effectively destroy venom in a test tube, but if placed in the wound it destroys the tissues, doing far more harm than good. *Don't* drink whiskey or other alcoholic beverages that will speed up the circulation.

The head of a Western Diamondback Rattlesnake, showing the characteristic facial pit behind and slightly below the small opening of the nostril.

A complicating factor in the treatment of snakebite is that people are sometimes not sure whether they have been bitten by a venomous or a harmless snake. Occasionally this dilemma may result from not seeing the snake that inflicts the bite. More often, it seems to be the result of the individual not recognizing the type of snake. Because of this uncertainty, the painful treatment for snakebite sometimes is given to individuals who have not been bitten by a venomous species. On the other hand, much valuable time may be lost awaiting the appearance of positive symptoms before beginning treatment. Careful examination of the teethmarks at the site of the bite may reveal whether the bite was made by a harmless or a venomous snake. A venomous snake typically leaves two prominent fang punctures. There may or may not be a double row of smaller teethmarks between the two fang marks. In the case

of a bite by a harmless snake there are typically four parallel rows of small teethmarks, with the two inner rows usually longer than the outer. The difficulty with diagnosis by teethmarks alone is that the snake does not always make a "typical" bite.

Obviously the best way of knowing what type of snake is involved in a bite is to learn the different kinds of venomous snakes that may be encountered in the region where you are. This is a relatively easy matter because in the United States there are always fewer venomous than harmless species in any given locality. The number of venomous forms will vary from none, in Maine, to as many as fifteen, in Arizona. Except

Learn to know which is ven omous and which isn't! TOP This is one of the bande Water Snakes, non-venomous which is sometimes mistake for the Copperhead. LEFT The Copperhead's bold pat tern, with bands that wide as they approach the belly is unmistakable. BELOW: Th harmless (and beneficial Milk Snake, or House Snake need never be confused wit the Copperhead. Its band do not widen on the sides nor extend all the way down

for the Coral Snakes that are found in the southern and southwestern states, all of our venomous snakes belong to the family of Pit Vipers. This name is derived from the fact that in all members of the family there is a prominent sensory pit located on the side of the face between the eye and the nostril, as shown in the head of the rattlesnake illustrated here. Thus if you are bitten by a snake whose identity you do not know, kill it immediately if possible and look at the side of the head to see whether or not it has the sensory pit. In making this examination *do not* touch the snake's head with your fingers; use a stick.

The Coral Snakes, of which there are four forms in the United States, can be readily identified by their distinctive color pattern. In the region where the Coral Snakes occur there are several species of harmless snakes that have an amazingly similar appearance. However, the colors are arranged differently and the harmless species can be separated easily from the venomous forms by the color pattern. In the harmless species that resemble the Coral Snake the red color is in contact with the black, whereas in the Coral Snake the red touches the yellow color.

Various harmless water snakes are often mistaken for the two races of venomous Cottonmouth Water Moccasin of the southern states. The venomous species can be identified with certainty by the presence of the facial pit and the fact that on the underside of the base of the tail most of the scales are undivided, forming a single scale across the tail. The harmless species of water snake lack the facial pit and have the scales on the underside of the base of the tail divided, forming two rows of scales. The venomous Water Moccasin is found only in the lowlands of the southern states. Along the Atlantic Coast, it does not occur farther north than Virginia and in the midwestern states it occurs northward up the Mississippi Valley only as far as southern Missouri and southern Illinois. Despite this limited distribution, most water snakes found anywhere in the United States are erroneously called "Water Moccasins."

The Copperheads, comprising four races, occur over a wide area of North America from Texas to Massachusetts. Over much of this region the Banded Water Snake and the Milk or House Snake are frequently mistaken for the Copperhead. Aside from the absence of the facial pit in the harmless species, there are noticeable differences in the color pattern when all three are seen together. In the Milk Snake the large spots on the back do not extend far downward on the sides, and it has a series of smaller rounded spots low on the side. This is in contrast to the Copperhead where the bands go completely from side to side all the way down. They differ further in that in the Copperhead the bands are widest at the bottom. This last feature serves also to distinguish the Copperhead from the banded water snakes, in which the bands are widest on the back.

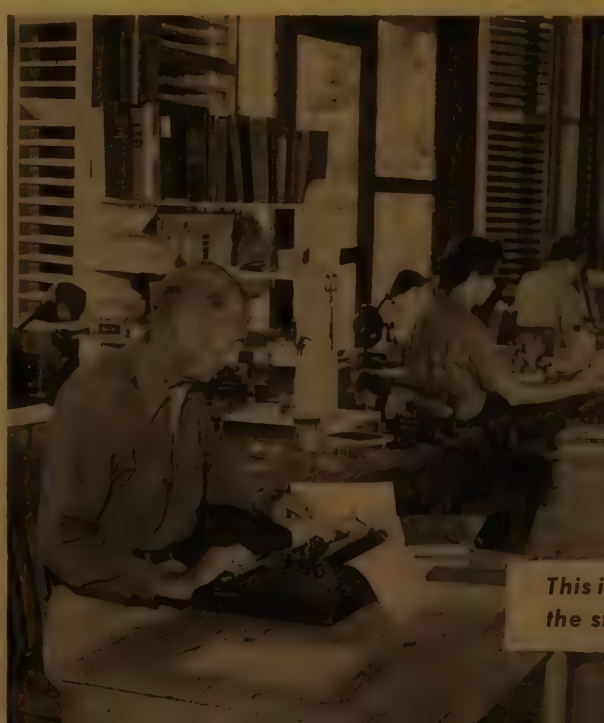
The rattlesnakes, of which there are more than thirty different forms recognized in the United States, are the most widely distributed of our venomous snakes. Some kind of rattlesnake is found in every state except Maine. The Timber Rattlesnake was formerly found in this state, but has been exterminated there and none has been found since the beginning of the present century. The greatest number of different kinds of rattlesnakes are found in the southwestern states. The rattlesnakes include our smallest venomous snake, the Ground or Pygmy Rattlesnake that is less than three feet in length, and the largest of our venomous snakes, the Eastern and Western Diamondback Rattlesnakes, both of which have been measured at more than seven feet in length.

Rattlesnakes can be identified by the rattles at the end of the tail. There is a popular misconception that a rattlesnake will always sound its rattle before striking. This sportsman-like warning reputedly makes the rattlers the gentlemen among snakes. Unhappily, many rattlesnakes do not practice such a romantic code of ethics and may strike without ever rattling.

It is beyond the scope and intent of this article to provide detailed information on the identity, distribution and habits of all of our venomous snakes. Anyone who spends much time in the country should acquaint himself with the types of venomous snakes he may encounter, as well as the harmless species that might be mistaken for the dangerous ones. There are a number of popular books available on the snakes of the United States that provide information on the identification and habits of these snakes. Two inexpensive booklets, authoritative and well illustrated, have been published by the New York Zoological Society – "Snakes of the Northeastern United States" and "Poisonous Snakes of the New World," both by Clifford H. Pope. Other and more elaborate works are available through booksellers. The most recent is "Field Book of Snakes of the United States and Canada," by Karl P. Schmidt and Dwight Davis. Also valuable to have or consult are: "A Field Book of North American Snakes," by Raymond L. Ditmars; "Snakes Alive and How They Live," by Clifford H. Pope; and "Reptiles and Amphibians of the Northeastern States," by Roger Conant of the Philadelphia Zoo.

"SIMLA" IN PICTURES

FOR A LONG TIME *it has seemed to us that Dr. William Beebe was holding something back. It is true that he has written articles about his Department of Tropical Research laboratory at "Simla," in the Arima Valley of Trinidad, and that our January members' meetings have been enlivened by Jocelyn Crane's astonishingly beautiful motion pictures of Simla's scientific work. But, somehow, the human side of the laboratory never received much emphasis — the staff's problems, their techniques, the routine of their days and nights. It seemed to us that an interesting picture might be developed around the research methods of such a laboratory in the tropics, so early in April Sam Dunton, our Staff Photographer, and William Bridges, Curator of Publications, flew to Trinidad. You'll see the results, in color, next January at the members' meeting.*



OUT OF THIS WORLD

By WILLIAM BRIDGES

AT THE MOMENT this line is being written it is two minutes past ten o'clock on the night of April twentieth. The place is Simla, the laboratory of our Department of Tropical Research in the Arima Valley of Trinidad, and everyone else in the valley and in the laboratory seems to be asleep except Will Beebe and Jocelyn Crane and myself.

The laboratory is dark beyond the pools of yellow light on our three tables. It is a warm darkness just outside the open doors but it deepens to intense blackness where the forest begins a few yards away, and it fades to faint starlight above the western ridge of the mountain.

There is absolutely nothing unique or historical about this particular moment, but just the same I wish I could preserve it in words. A photograph wouldn't do it, because that would leave out the clacking and squeaking of my typewriter, the sound of glass clinking against glass as Jocelyn tips preserving alcohol into a vial, the sweetish odor of the alcohol that the night wind carries across the laboratory, the ticking of the clock, the rumbling hollow cry of a *Bufo marinus* down on the river bank and the creaking of his chair as Will turns to lay a folder of notes on the shelf behind him.

Those are the sights, sounds and smells of this particular moment in eternity, in this particular spot. I don't know what Will and Jocelyn are thinking — they appear to be intent on the manuscripts and vials on their tables — but up to now I have been thinking mostly about the visitors we had this afternoon. Pleasant people, but practical people. I took a walk with one of them, up the trace (as they call a path here) that leads to the spring. We strolled past the twelve straight, sturdy mahogany trees that are Will's pride and joy, and our visitor glanced up.

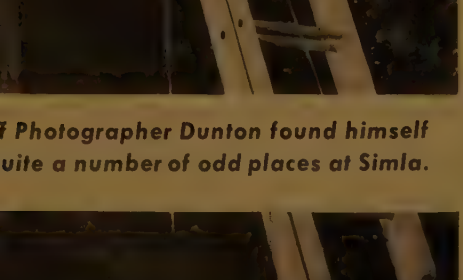
"Splendid trees, aren't they? But of course those wild pines ought to be removed. Mosquitoes. Very fond of breeding in wild pines."

There was no point in my setting him straight, but if he says that to Will, he'll be informed in no uncertain terms that the wild pines (i.e., bromeliads) are

Simla: the laboratory and
Crane, Ordway, Fleming.

There's a pleasant view down the lush, tro
ical valley from the door of the laborato

f Photographer Dunton found himself
uite a number of odd places at Simla.



not going to be removed, mosquitoes or no mosquitoes. Why, in an one of those bromeliads you can find snails and spiders, insect larvae a dozen kinds, worms, ants, maybe tiny fogs, certainly microscopic lif in abundance – enough life, in fact, to furnish out a whole biologic laboratory with a year's work.

I've been thinking, too, about some other casual comments by ou visitors. The bubbling lady from Port-of-Spain who thought Simla wa adorable, but wouldn't it be nice if one's friends could be induced t build country houses on the hills roundabout so there would be compan in the evenings. And further back to the woman who dropped i unexpectedly one night and found Jocelyn stooped over a microscop "Does Dr. Beebe make you work at night? How awful!"

* * *

Having been thinking about things like that, it is not surprisin that at two minutes past ten o'clock it suddenly occurred to me tha we are out of this world – the world that thinks in terms of building and crops and political maneuver, of whirring engines and streets fu of people and social evenings at bridge. You always have that feelin of detachment, of course, if you have anything to do with the so-calle pure sciences, but it seldom strikes you consciously and acutely as did me at this particular moment. Here were a couple of people sittin up late on a Sunday night in a laboratory perched on a mountain spu in Trinidad, slaving away at something that will never make the worl a dollar richer, but only maybe a little wiser. You could duplicate th scene in scores or hundreds of laboratories around the globe at th instant, where other men and women are working at desks like thes under identical gooseneck lamps, or lanterns, or in sunlight, and you're a practical person who sees bromeliads only as a breeding plac for mosquitoes, black sage as a hazard to the cacao crop instead of haven for butterflies, and the pressing forest as an unsightly wilderne that ought to be cleared away to keep insects at a distance – well, that all right, but you wouldn't be very happy at Simla, or in any othe field station where (as Will Beebe says) naturalists are trying to lear something about something.

And while I'm about it, the title of this piece suggests a differen idea. Here at Simla we *are* out of this world, in motives and behavior a surely as in space, but there's another meaning that could be extracte I'm thinking about the world Will Beebe has been creating all thes years by the distillation process of his imagination and perceptio There he sits under his little yellow light, turning the pages of his not book, twisting to peck at his typewriter with two fingers. He has gon around the world to study pheasants, down in the sea to study bathy pelagic life, to Bermuda, to British Guiana, to Venezuela, finally he to Trinidad, to "learn something about something." I suppose he is practical enough fellow in his way – you wouldn't call him exactly "long-haired" scientist! – but he hasn't been concerned about the pra ticality of his concerns, any more than any other dedicated naturalis His world has always been the natural world, and out of this world h has known how to extract a vision the rest of us can share. I think that a pretty good accomplishment.

Life in a tropical field station is seldom as relaxed as this indicates. A Berbice chair happened to be under the gigantic saman at St. Pat's, next door to Simla, and Dr. Beebe halted to spy on a hummingbird feeding in a clump of scarlet orchids.

Behavior Is Contagious, Too

By EDWARD A. ARMSTRONG

ONE OF THE MOST REMARKABLE EXPERIENCES the naturalist may enjoy is the sight of a large flock of birds or herd of mammals manoeuvring together. No longer may enormous herds of Bison be seen stampeding across the prairie and the herds of migrating Caribou are not as impressive as they were when the first white trappers went north, but in Africa, as a recent film reminded us, awe-inspiring numbers of large animals may still be found.

It is not surprising that the sight of huge herds in motion should have impressed men of the distant past. In the caves of southern France have been discovered fragments of bone engraved with vivid representations of galloping herds of Reindeer and Wild Horses. They are among the most

exciting surviving relics of the works of prehistoric men, for they suggest not only the characteristics of the animals but also the sense of swift, corporate, motion. As we look on these sketches, with the aid of a little imagination we almost hear the thunder of hooves echoing down the ages. Perhaps, as some scholars believe, these drawings were made with the intention magically to increase the numbers of the animals or to render them more easily approachable by those who would slay them. One wonders, for example, whether the engraving from Ariège showing a man wearing a deer skin and antlers depicts, not a magician in the full sense, but a man who exercised the craft of luring animals near to where the hunters were in ambush. Whatever the explanation of these scenes may be, they show that men of the Stone Age were impressed, as we are, by the concerted movements of a large number of animals. If we are seldom able to see herds of antelopes or other ungulates in full gallop, most of us have opportunities to watch the marvellous evolutions of flocks of Starlings or wading birds, swerving by and banking with astonishing unanimity. Even so common a sight as the flight of a flock of pigeons deserves our admiration.

A herd of Pronghorn Antelope flees, as one animal, across the vast tableland at Pitchfork, Wyoming. A warning signal is the white rump flashing in the sun.

Charles J. Belden Photo

We are so familiar with the activities of birds in which one copies the behavior of another that their significance may not be immediately apparent. We have all watched a flock of ducklings waddle away in a compact group or noticed how, when a sparrow is alarmed and flies up, the whole of the little flock often flies with it. It is worth while to ask ourselves, What is the psychological basis of these forms of behavior and what functions do they serve?

The function of corporate flight is fairly obvious. The fleeing of one member of the group is in itself the signal for others to act likewise — though such action is often emphasized by a warning call. Very often the individuals do not wait to spy the dangerous object for themselves. Among birds, the sight of the uplifted wings of a companion is sufficient to initiate the same action by all the members of the flock. Often, indeed, they take flight needlessly, but it is better to be safe than sorry, and one day the persistent laggard will fall victim to a marauder. Large birds which roost on the ground are particularly vulnerable and it is noteworthy that one of these, the Partridge, employs two "safety devices" — the birds roost together in a covey and when one is alarmed all disperse in different directions. Moreover, on taking flight the birds rocket straight upwards. The prowling fox must often be baffled. There are tropical species of butterfly which roost in clusters and take flight together when disturbed. In such circumstances a predator is liable to be somewhat bewildered, just as he may be when a whole brood of young birds bursts forth from the nest. Sometimes he may muff his pounce and go hungry.

Among very social birds it is common to find that either the wings, rump or tail bear some distinguishing mark so that they render the individual's alarm-flight more conspicuous, or facilitate a following movement by the leader's fellows. Similarly the white tail of such an animal as the Virginia White-tailed Deer serves both as an alarm which sets off similar stampeding on the part of others and as a marker for them to follow. The point of special interest is that a badge or signal adornment is involved which is additional to, or accentuates, the fleeing movements which are usually sufficient in themselves, among strongly social animals, to initiate similar movements by others. Off goes the signal, bang goes the reaction; but the factor of primary importance is the tendency of one animal to react as it sees another doing.

The susceptibility to do as others do is conspicuous in regard to a quite different type of behavior. It has been noticed that the sight of an individual eating stimulates others to eat also. Thus men, birds and fish eat more in company than when alone. Place a well-fed hen with a party of hungry birds busily pecking up meal and it will begin to do the same, although it does not need the food. Perhaps some tummy-aches after children's parties are due to a somewhat similar impulse! More remarkable is the fact that a hungry bird placed with satiated birds may behave as if it, too, had eaten well. Konrad Lorenz, the Viennese ornithologist who has con-

Pigeons wheeling in unison above the rooftops of the city are a familiar sight, but always a spectacular one. Pigeons flock naturally, but they are trained to fly around a rooftop loft.

tributed so much to our knowledge of bird behavior, had two groups of Night Herons, one in an aviary, the other outside. After the birds in the cage had been fed they perched in the lethargic, hunched-up attitude which might have inspired the poet's line, "Irks care the crop-full bird?", whereupon the hungry Herons outside assumed the same posture, as if they, too, were replete! Thus the tendency to do as other do, so far as these birds were concerned, dominated their hunger. Its potency must at times be very great, to over-ride so powerful a craving.

In yet another sphere "suggestibility" plays an important rôle. Set a vigorous man to work with an easy-going gang and you will probably find that he, too, will take things easy. He may not do so intentionally; he just falls in with the rhythm of his mates. The influence of one's fellows is similar in ant society. The author of the Book of Proverbs was wiser than he knew when he wrote: "Go to the ant, thou sluggard." A Chinese investigator, Chen, found that an active *Camponotus* ant placed with go-slow workers reduced its tempo but, on the other hand, a lethargic individual speeded up its efforts when associated with industrious companions. La Fontaine might have written an ingenious fable about this, but moralizing about such phenomena is out of style today. It is of sufficient interest to note that such similarity of behavior between organisms so different suggests that in at least this respect it is not fantastic to see something in common between the mentality of man and ant.

When engaged in photographing gulls nesting in a large colony, I have been impressed, as have many others who have studied such birds, with the extent to which the initiation of one form of behavior spreads from one individual or a small group to many others, so that one naturally thinks of this phenomenon as "contagious" behavior. If one bird calls, cries may forthwith resound from all over the colony, and at times a large number will start preening, infected by each other's example. Every now and then scores or hundreds fly up and circle around together for no obvious reason, though probably one bird, taking fright at some harmless sight or innocuous experience, has thereby aroused the whole company. Watching Black Guillemots in the bay on whose shores their nests are situated one sees a group performing quaint water-dances arranged in fours or, perhaps, in single file. Subsequently, they all fly around together with the white patches on their wings twinkling, and when they alight they wheeze and bicker together. Community feeling dominates their activities. Every naturalist could quote experiences with one social species or another of a similar nature. Cormorants perform various activities together and the sight of a pair fighting is often the signal for several other birds to join in the affray as if they had decided no fight was a private affair but every squabble should be regarded as a free-for-all. So deep-seated is this tendency that the activities of a bird may elicit similar activities from an individual of another species. A male Shoveler Duck which flew over where a female Mallard was "injury-feigning," came down and performed in the same way. In Iceland I have seen a Dunlin feeding with Golden Plover and copying their actions;

when they flew it flew with them also. Such behavior is so common on the part of the Dunlin that the Icelanders name the bird "The plover's slave." Captive cranes can sometimes be induced to perform their nuptial dance if their keeper capers before them!

It must not be thought that because birds and other animals will copy each other in stereotyped and even incongruous ways that therefore their behavior can be explained by rule-of-thumb methods. For example, where learning is concerned, animals differ a good deal in the extent to which they are helped or hindered by being members of a group. Goldfish learn a maze quicker when in a small shoal than when alone, but Budgerigars are slower in solving such a problem when in company. Their sociability seems to be a hindrance, for they are apt to distract each other's attention from the matter in hand. Cockroaches also learn more slowly when with others. Thus contagious behavior may be advantageous in some ways and not in others. It is, as it were, attuned to the service of the animal's needs.

THUS FAR the term "imitation" has not been used, and for this reason – it is desirable to make a distinction between behavior in which one animal, seeing another doing some customary act, is thereby stimulated to do the same, and true imitation in which copying some novel act is involved. Thus imitation is behavior in which the organism reproduces an act which is not one of those included in its innate repertoire of instinctive acts. When a monkey, on seeing another grooming himself, does likewise, this is not imitation, because learning is not involved. If Pliny had been correct in saying that apes imitate every detail of the hunter's movements, we would have to admit that this was truly imitative behavior but his statement is derived from hunters' imagination rather than fact. I suggest that such acts in which like elicits like and inherited patterns of behavior are involved should be classed as "mimesis." Mimetic activity is common among animals, as we have noted, but true imitative activity is rare. Indeed, some psychologists, such as McDougall, have denied that it ever occurs below the human level of mentality. We need not discuss this matter here. It is sufficient to note that copying or reproducing another's behavior may be on lower or higher levels, involving capacities of different degrees of organization, and that this low-level mimetic behavior characteristic of the lower animals is also characteristic of man. Yawning exemplifies a form of behavior common to man and monkey. Both yawn when bored. Moreover yawning is "infectious," as we have all noticed, and we may even yawn after seeing someone else do so without realizing that our yawning has been mimetically induced.

In some forms of hysteria, elements in human nature which bear a close affinity to the mimetic tendencies of animals make their appearance or, as we might justifiably say, "come to the surface." In Malaya natives are subject to an affection called *lâtah* which is of such a nature that those afflicted are possessed by an irresistible impulse to copy the movements of other people, animals or objects. A man will sway rhythmically to the swaying of a clump of bamboos or mimic the actions of somebody else. There is a story told of a Malay, affected by this malady, who observed a Tiger advancing toward him. Thereupon he began to imitate the beast's every movement. The Tiger fled. The tale may be *ben trovato* but many authenticated instances of the peculiar behavior of those suffering from *lâtah* are on record. In Siberia a malady of similar character occurs. A Russian writer describes an episode in which a company of the 3rd Trans-Baikal Cossacks was involved. The men began to imitate their commanding officer, echoing his commands and then his curses. The sequel is not on record!

There has been space to mention only a few illustrations of contagious or mimetic behavior among man and animals, but they are sufficient to show that "suggestibility" can be traced back to our animal ancestry. It is a quality which can lead men to disaster. We cannot forget those full-throated choruses of "Heil Hitler" and "Sieg heil" which the radio transmitted to our firesides from the Nazi rallies. The despot and the quack know how to exploit man's mimetic tendencies, and men as well as swine may hurl themselves with Gadarene blindness to destruction. Yet this very faculty is of inestimable value. It is the cement of society. Through it men can be of one mind in a house and in a nation. Mimesis is the foundation of cooperation in human society as among animals. It may be the means of ruin, or a powerful creative force for good.

SPRING comes to Jackson Hole

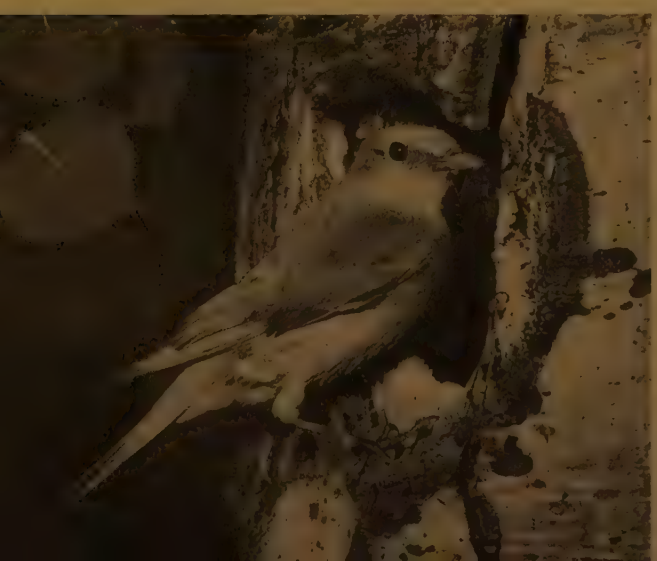
By TOM McHUGH

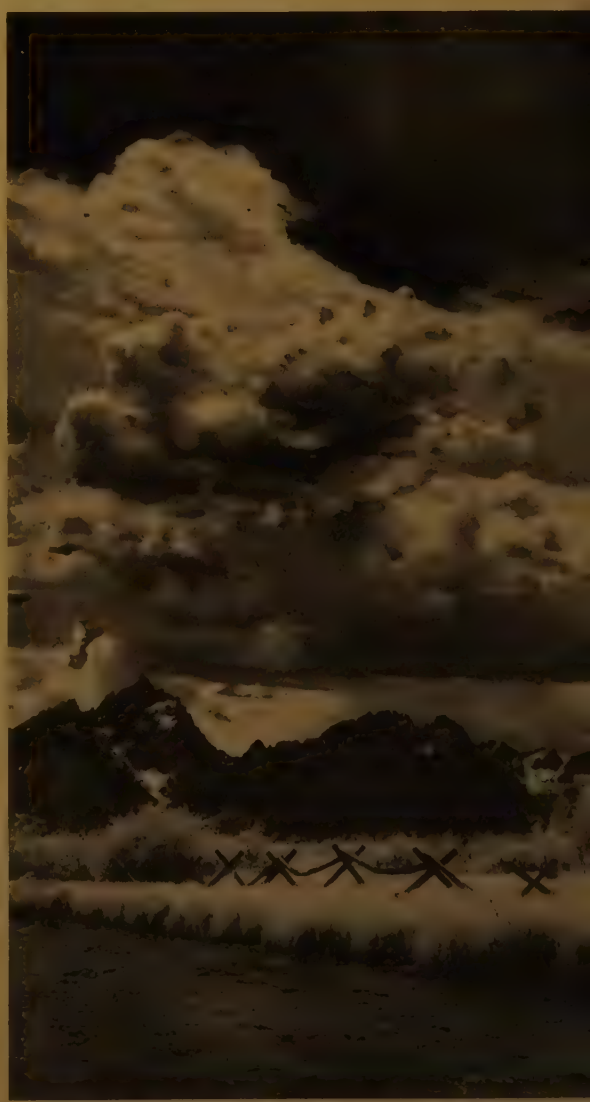
With Photographs by the Author

A HOWLING FEBRUARY BLIZZARD drifted more snow about a small rock cave in Jackson Hole, Wyoming. It blotted out trees and rocks and swirled into the crevices. Deepest winter, one would say. Yet now and then between the wailing blasts the first sounds of spring began to filter out of the cave. Just a few whinings and whimperings.

The sounds went largely unnoticed, for there are few residents in this wilderness of snow. Perhaps the Mountain Chickadee snuggling deep in the branches of a nearby pine heard them. And of course the bear sleeping in the back of the cave was well aware of them. She brushed a paw against her newborn twins as they alternately nursed and whined.

It is difficult to imagine how the young of such a large beast could be so small. Each cub was only about eight inches long and weighed less than a pound, or about 1/300th of the mother's weight. They had no teeth and were clothed with





The iridescent Mountain Bluebird nests in a disused Flicker hole.

such a thin layer of hair that they were practically naked. Their eyes were still shut. Their mother curled around them to keep them warm.

We may be astonished at their size, but tiny cubs are really most practical. They would have to live off food stores from the mother's body for the next two months, for not until April would she wander out of the den for more food. That such small cubs do not make excessive demands on her food resources is shown by the fact that both mother and cubs emerge in good condition. Larger cubs would probably leave her emaciated.

In April, spring and winter start fighting for supremacy, but winter wins most battles in the mountains. There are still one to two feet of

The Marmot emerges from his rock pile to greet a belated spring in the high mountains. This is a typical alert posture.

Clouds rolling in over the Teton Mountains may unload rain or even snow during the spring-time months of May and June.

Bear cubs are born in a den during the deep winter, but they are old enough to follow their mother out in late April. They are full of energy at this time and much of their day is spent in scampering play.

snow on the ground, and the temperature often stays around freezing. Nevertheless, a few robins and bluebirds push into the area. And on the first warm day, the bear family emerges.

The mother eagerly plods through the spongy, half-melting snow, leaving a series of deep holes behind her. The cubs follow much more slowly. They tumble into the deep holes and can scarcely waddle out to the next. They high-center in the soft snow and have to paddle out again. They lag behind and prompt their mother to sit down and wait for them.

When the old one arrives at a snow-free, south-facing slope, she starts to eat grass. But the cubs still have plenty of energy left for play. They wrestle and box and chase each other. One sneaks up behind the other, pushes him into a puddle and then scampers away to avoid reciprocal splashes. They fight over a snowball and then are most puzzled when it disintegrates under their struggles.

All this frolic suddenly stops, however, when the mother growls a warning signal. They have learned already that a sharp cuff is the punishment for not heeding the commands of the old one. Immediately they scamper into a large spruce, climbing seventy feet up with the agility of a squirrel.

Meanwhile, the mother stares toward the brow of a nearby hill. She climbs to a low limb in the spruce, bares her teeth in a vicious growl and then quickly descends. The object of her threatening glances is a male bear that had accidentally or

purposely wandered into the area. It was probably with evil intent, for he knew only too well how tasty small cubs are.

While the cubs crawl still higher in the spruce, the female rushes at the challenger. The resulting chase is so close the two bears appear as one. Suddenly the male stops, turns and rears up on his hind legs. The female takes the same pose. The battle that follows is identical to a heated prize fight with the exception that every punch finds its mark. After several exchange slaps, the chase starts again and the mother finally bluffs the male off her land.

With the "all clear" signal from the female, the cubs slowly work their way back down the spruce.

Like the bear cubs, other Jackson Hole youngsters must continually wage a battle against the forces of the wild. They are threatened by predators which are lean and hungry after struggling through the winter. And they must fight snowstorms which continue until June.

In the snow-speckled April meadow, another new youngster has just arrived. A few feet from the edge of the Buffalo herd a cow licks the matted fur of her calf. Two young bulls walk over to inspect and help lick the new arrival. Overhead, two circling Ravens eye the calf with other thoughts, and as the cow moves a few feet away to graze, they land and hop forward. The eyes of helpless animals are their favorite delicacy. As they near the calf the cow quickly wheels and charges. The Ravens fly out of her reach, but they still keep close by. Finally, the cow has to stand sentry duty above her calf to make sure the Ravens will not sneak in.

Within less than an hour, the calf takes his first steps. With his bowed limbs he gives every appearance of being a giant daddy longlegs. Slowly, he spiders his way after his mother. Shortly, the two of them may be running on mass stampedes with the herd, and then the youngster will be at the mercy of the thundering hoofs of the older bulls and cows, for they play no favorites. A young calf must constantly beware the menacing blows from the hoofs and horns of other buffalo — or perish.

It is doubtful that any calves now fall to predators, for the buffalo cow will defend her calf against all enemies. If she is losing the battle, she can always depend on help from the herd.

Last spring a Yellowstone Park ranger found shreds of circumstantial evidence to prove this. In the center of a heavily trampled piece of meadow he found the battered carcass of a large Grizzly Bear. All the ribs on one side were broken. Two holes were punched in its side. The entire area was strewn with pieces of Buffalo and

The Buffalo cow loyally defends her calf against Bears, Coyotes and Ravens, but the calf must be continually alert to dodge careless hoofs or purposeful jabs of the horn by other adult Buffalo.

Grizzly Bear fur. Although no one saw the actual battle, it is quite possible that the Buffalo was defending her calf against this most powerful predator.

When the snow banks slowly disappear in April to give the first indication of spring, the Elk migration starts. Thousands of Elk which were kept low in the valley by a fence of deep snow now push through the disintegrating barrier. Small groups of five to twenty split from the main herds and start pushing toward the high country. The groups start off with both cows and bulls.

Toward the end of May, however, the groups break up. Pregnant cows slow down, drop out and look for calving grounds. The bulls push past these maternity wards, ever marching on toward the high mountain meadows. Even though the days will be freezing at that altitude, they will taste the first flowers of spring.

Three Elk cows caught my eye on a low, marshy meadow. As I approached, they suddenly rose, froze for a moment and then began prancing off across the meadow. But their retreat was not a rapid one. Rather, it was a slow and worried escape. They would run a few yards and then pause and look back, ears attentive and eyes anxious. Then they would circle the meadow and again stare at me. It was just the type of behavior I was looking for; these cows were inadvertently giving away the fact that somewhere in the meadow they had hidden their new calves.

Knowing where the cows had just been was no accurate clue to the location of the calves. The cow might bed down for the day and then sneak off at dusk to nurse and lick her hidden calf. Under small bushes, behind clumps of grass — I searched everywhere as I crossed back and forth over the meadow. Finally, I spotted the calf in a small hollow in the meadow: I was sure I could make out the spots on its back and the outline of its head. I rushed to the spot and found only a "mirage," a twisted mass of dead reeds that fooled me completely.

A few feet farther on I spotted another likely-looking object. From ten feet away it looked like no more than a rotten log with a few sunflecks. Look more closely, though! This time it *is* the reddish-brown calf, lying there with its head tucked neatly on its legs, its ears laid back and its eyes open to watch my every move. It looked dead, but the rhythmic breathing of its body shattered this thought.

Coyotes consider spring a seaso of plenty. They may feed on th carcasses of winter-killed ani mals, which are always numer ous, or they find an abundanc of baby birds and mammals

By freezing in such a position, calves usually go unnoticed. Furthermore, their scent is so weak that few predators get close enough to detect it.

When a Coyote locates a calf, the cow immediately rushes over to drive it away with flailing hoofs. But while she is busy chasing away one Coyote, another may creep in and snap at the calf before she can return to it. When more than two Coyotes play the grim game, the Elk cow has little chance of saving her calf. Weak and exhausted, she can protect her calf only by standing directly over it. The Coyotes finally move in and kill the calf under her body.

Calves normally remain hidden for two or three weeks. Eventually, however, they revolt against this depositing technique. When the calves continually get up against mothers' orders, the cows finally let them have their way. Once again, the cows with their new calves resume the migration and push forward toward the high mountain meadows.

Also in late May, the Moose calf arrives in a shady willow tangle. Within a few hours after birth it starts to follow its mother, but the first attempts at walking appear doomed to failure. The calf looks like a body mounted on tall, slender bamboo shoots as legs. The stilt-like legs bow in and out and give every appearance that the entire animal will shortly be lying in a tangled heap on the ground. Momentarily the rear half of the calf starts to sway sideways and is saved from near collapse only by a quick step forward.

Within a few days, the Moose calf starts traveling with its cow. At first, it stumbles over logs and occasionally gets caught in willow bushes. Yet it is able to swim almost as soon as it can walk. The mother seldom hesitates to lead her calf across any body of water. If the calf gets tired, it can rest its head on her rump or throw a leg over her neck. She then tows it alongside.

The calf may even take to the water for protection when only a day old. If its mother is not close by when danger threatens, it rushes into the water and submerges its entire body. Only the tips of its nostrils remain above the surface. When the emergency is over, and the calf comes out after as much as one hour's dunking, its fur is still practically dry!

The precipitous ledges and rocky crags high on the edge of Jackson Hole are as much a place of safety for the Bighorns as the willow tangles for the Moose. When the lamb is about to arrive, the ewe retires to a steep cliff where she can spot approaching enemies from a good distance. The first lamb is likely to be born on a gravelly, near-vertical delivery table. A half hour later its twin arrives. The helpless creature lies for a moment on the loose gravel and then starts to slide down the steep bank. A few feet ahead looms an abrupt precipice with a drop of a hundred feet to the sharp rocks below. The ewe quickly senses the danger, jumps over the skidding lamb and paws out a small notch in the cliff. The lamb skids to a smooth stop in this.

By the time most of these big game animals have borne their young, spring has distinctly arrived in Jackson Hole. Now, in late May, only a few stubborn snow drifts dot the valley floor. The aspen groves respond to the warmer weather (it goes below freezing only occasionally now) with a flurry of crisp, yellow-green leaves.

And in the aspen grove the most characteristic

Moose cow and calf are inseparable for at least a year. During the day they hide in the dense willow tangles, but they emerge to feed in the cool, early morning, or late in the afternoon.

The Tree Swallow alights on the lip of its nesting hole in an aspen tree. A pair of Flickers made the original excavation, nested in it, and then moved on.

residents finish their courtship dance. Male and female Red-naped Sapsuckers face each other on an aspen stub, bob and salaam, bend their bodies from side to side and constantly wave their bills at each other. The result of all these exercises is a mating bond which eventually yields a nestful of youngsters.

First must come the nesting cavity, however. The female sapsucker is very wise in her choice of an aspen tree. Aspen grows quickly and also disintegrates equally as fast. By the time a tree is large enough for a sapsucker burrow, more than half of the wood has started to decay. Only the outer shell of the trunk is solid enough to support the tree. This one- or two-inch layer will give the sapsucker the most trouble.

She starts with a small hole and gradually widens this out by chipping away small bits of wood. By the time she works to the spongy core she will be able to chip more rapidly on the gourd-shaped excavation.

As the hole gets deeper the pile of chips begins to hinder progress. She gathers these in her bill and dumps them out the nest entrance.

After a week of using her bill as a chisel and her head as a hammer, the nesting cavity is complete.

The Red-naped Sapsucker is the carpenter of the aspen colony, for it is largely through the home-building efforts of this one species that many other birds are brought into the area. Each year the sapsucker usually insists upon a new excavation, and each year its abandoned nesting holes serve as homes for other birds. Other hole-drillers, like the Red-shafted Flickers and Downy and Hairy Woodpeckers, may occasionally chisel out their own nesting excavation. They are not as industrious as the sapsucker, for they frequently use one of the previous year's cavities.

Even the tiny chickadee may occasionally dig its own home in the aspen. Since it cannot pierce the tough outer layer with its weak bill, it must use some break in this shell to gain entrance to the rotten interior. Often a hole made by some woodpecker in search of a grub serves this purpose. Then the chickadee industriously chisels this into a cavity nine or more inches deep. Unlike the woodpeckers, it is clever enough to carry away the betraying wood chips and scatter them over a wide area.

If the sapsucker is the main carpenter of the aspen grove, aided to some extent by woodpeckers and chickadees, who are the roomers that later use the abandoned homes? Violet-green swallows, Tree Swallows and Mountain Bluebirds fill the spaces.

Where the sapsucker was satisfied with merely a few wood chips for her nest, these other birds are more particular. They construct their nest of grass, strings, twigs and feathers. And to build this seemingly simple nest, they may take three times as long a period as the sapsucker took to first excavate the nesting hole.

Since many of these birds are abundant in Jackson Hole, the demand for nesting cavities is often greater than the supply. Where excavations are numerous, as in a particularly well-riddled tree, swallows form colonies.

One "aspen tenement" held bluebirds on the first floor, flickers on the second and Tree Swallows above them. There were even backyard

squabbles as the small yet agile bluebirds and swallows dived at the clumsy flickers to try to drive them out.

In June, when summer is starting to arrive on the valley floor, spring is just blossoming in the high mountains surrounding Jackson Hole. A trip up to 9,000 feet revealed a land of ice and snow.

When we first emerged from the tent one morning, our breath was quite visible in the crisp morning air. After breakfast, the first sign of wildlife was a marmot that peeked at us around a rock. He contemplated us with a quizzical and hungry eye, or so it seemed from subsequent events.

A few minutes later we became aware of noises behind the rock. Cautiously, we crept to the top and peeked over. We needn't have been so cautious, for the noise-maker, a marmot, couldn't see us anyway. He had firmly stuck his head into a date bread can. As he walked rapidly forward, he resembled some sort of tank pushing its way among the tin cans. Then he would stop and jump up in the air, twisting back and forth as he fell. Evidently, he expected the can to remain up while he wiggled out. After repeating this dance several times, he ended up on the top of a big boulder. The next leap found him careening four feet off the boulder toward the ground.

Red-naped Sapsucker brings a viscous mass of sects and pine sap to its youngsters in the nesting vity in an aspen. Later, other birds will nest here.

Finally, we were able to grab him and pull off the can. A stunned marmot blinked his eyes once and then galloped away to his rock pile.

The rock pile is the most secure animal home in the mountains. The marmot uses it as a bomb shelter against hawk and eagle attacks. The entrance to his tunnel between the rocks is so small that a Coyote cannot squeeze in. The rock pile also is a well insulated place for hibernating, for the marmot is the laziest animal in the high country.

From September to June he sleeps deep under his rock castle. In late June he first comes out to greet spring in the mountains. The snow has just melted away from his favorite meadow, and he rushes out to nip off the first greenish and purplish sprouts.

Later on, the meadow will remain lush as streams continue to trickle through it from higher snow fields. But he will always waddle out into the meadow with caution. There, he is no longer protected by his rock pile. He will quickly gallop back to his burrow if a sentry on top of the rock fortress whistles a danger call.

While the marmot is reveling in his late seasons, spring has long since waned on the valley floor. The bright yellow-green leaves of the aspens fade. And in the nearby stream, the Beavers are already planning for winter.

Toward evening they come up to gnaw on the aspen trees. Big chips fall to the ground as their large incisor teeth bite and pry into the soft wood. Occasionally the stillness of the night is broken by a loud crash as the tree falls and the brittle branches shatter. Almost all the trees fall downhill toward the stream — not because the Beaver is an expert forester but because most of them naturally lean that way.

Next, the Beavers trim off the branches. Some eat the bark on the spot while others clamp their teeth into the branches and drag them to the

pond. They push them deep into the mud to serve as a winter food store when the pond freezes. The thick trunks are gnawed into sections small enough to be handled by the Beavers.

As one Beaver rolls a piece of trunk to the water, bits of twigs and old feathers pour out of a hole in the wood. Yes, this was the bluebird tree. Before the summer is over the entire sapsucker home-building project will be downed.

But the sapsucker project cannot be stopped by a few Beavers. There are still many other aspen colonies, and even this particular one will rapidly grow up again when the Beavers move on to another site.

Nor will the other wilderness creatures be stopped by snowstorms or hungry bears or Coyotes or hawks. The pulse of life in Jackson Hole will continue beating, to bring forth many more springs as bountiful as this one.

Spring is always a stormy time in the Jackson Hole country, and for days Mt. Moran may be blotted out by low-hanging clouds. But these storms are a sure sign of the end of winter.

News from the Conservation Foundation

President Osborn Sails for Europe

Armed with a long list of British and European conservationists, scientists, publicists and public officials, Fairfield Osborn, president of the Conservation Foundation and the Zoological Society, sailed April 28 on the *Ile de France* for the purpose of reviewing current conservation thinking in continental Europe and Great Britain at close range. He expects to discuss resources and population pressures with some of our scientific advisors overseas as well as other leaders of thought in Western Europe.

His exact itinerary was not complete at the time of sailing, being subject somewhat to the availability of some of the people he wants to see. One of his purposes is to explore the desirability of inviting a small number of leaders of thought, not primarily demographers, to attend a limited conference to be held some time within the next year or so to focus opinion on the world's population problems in relation to resources.

President Osborn also expects to review the progress of the Zoological Society's "Point Four Program" of assistance to European biologists, which was announced at the annual meeting and is now in operation.

Annual Report for 1951

The streamlined annual report of the Conservation Foundation is off the press and has been mailed to the organization's many friends here and abroad. Any member of the Society who wishes a copy may have one on request to the Conservation Foundation, 30 East 40th Street, New York 16.

To encourage the adoption of conservation education programs the report has been sent to the presidents of 46 universities and colleges.

Recent talks with faculty heads at the University of Pittsburgh indicate the possibility of an expansion in the conservation education program of that institution.

Spanish-Portuguese Films Have Washington Preview

Under the auspices of the Department of Economic and Social Affairs of the Pan American Union, the Foundation's Spanish - Portuguese sound-tracked versions of "The Forest Produces" and "Yours Is The Land" were previewed by some 200 persons at Pan American Union Headquarters, Washington, D. C., on Wednesday evening, May 7.

The audience was composed not only of officials from a number of South and Central American embassies and consulates in Washington, but also of a large contingent of Americans who have interests in one or more of the Latin American nations. It is hoped that this auspicious initiation will start our films off to a wide distribution in South and Central America. All the film production of the Foundation has now been sound-tracked in both Spanish and Portuguese, and natives from such countries as Brazil and Mexico have expressed themselves as of the opinion that these pictures will be helpful to the conservation cause in Latin America.

The "Living Water" series is nearing completion, and will also be prepared with sound-track for South American sale. The U. S. State Department has purchased a number of copies of "The Web of Life" for sale in foreign countries.

New York State Teacher's Guide Now in Preparation

The Conservation Teacher's Guide for use in the school system of New York State has been unduly delayed by the difficulty of deciding upon the proper person to prepare it. This person has now been found and has been commissioned by the State to complete the guide along lines agreed upon in conferences in which Foundation staff members participated.

This Guide is sponsored jointly by the State Departments of Conservation and of Education, as well as by The Conservation Foundation.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Four More Tiger Cubs— Other Animal News

Dacca, our prolific Tiger mother, produced her fifth litter on May 1, this time two males and two females. The babies are being reared by their mother, in the seclusion of the sleeping compartment in the Lion House, and will not be on exhibition until they are old enough to wander out by themselves about the middle of June.

* * *

Two nestings in the Zoological Park are being watched with great interest. A pair of Mute Swans built a nest on the shore of the little lake just south of the Zebra House and deposited four eggs. One set of vandals was driven off when a Pony Track attendant saw them beating the nesting bird with sticks; a few days later a boy was captured by a Children's Zoo attendant with all four eggs in his pocket. The eggs were returned and the Bird House keepers rigged up a high wire fence that now makes access to the nest extremely difficult for everyone but the swans. If their eggs are fertile, they should hatch about June 1.

There are 34 Giant Neotropical Toads in this heap as Dr. Oliver prepares to pack them in damp moss for shipment to the Max Planck Institute in Westphalia, under the Zoological Society's own "Point Four" program of aid to European biologists. The toads were collected by our Tropical Research laboratory in Trinidad.

The other nesting (besides the usual Canada Geese and Mallards and Black Ducks that try to nest around our ponds each year) is that of the pair of Darwin's Rheas. Attempts to incubate the first two eggs were unsuccessful; they were not fertile. Subsequently the birds' corral at the Ostrich House was enlarged and the male has built a nest and is sitting on two dummy eggs and two real ones. We still don't know whether the real ones are fertile.

* * *

Cecil and Penelope, the Duck-billed Platypuses, were taken out of "winter storage" and given the run of their summer Platypusary on April 21, almost three weeks earlier than last year, in the hope that by an early start we would catch the beginning of what would be the Platypus breeding season in Australia. If Penelope gives no indication of egg-laying by late June, the breeding attempt will be abandoned and the Platypusary opened to the public for an hour each day, as in the past.

* * *

At his latest weighing, in early May, Herbert the Walrus weighed 487 pounds, and by early June should be well over 500 pounds — a good start on his eventual 3,000 pounds, since he is only a year old this spring. In preparation for the hot summer months, the Construction De-

The Children's Zoo reopened for its twelfth season on the Saturday before Easter and almost immediately—as soon as the weather settled—began breaking records. There were 7,750 visitors on Sunday, April 20, and a new high was set on the warm Sunday of May 4, with 8,049 visitors.

partment has erected a stout awning frame over a section of Herbert's pool and he will be able to take shelter from the summer sun. To date, on even the warmest and brightest spring days, he has shown no signs of distress and his appetite continues to keep pace with his weight.

Staff Presents Four Papers On Cancer Research

Cancer research has assumed increasing importance in our Aquarium laboratory in recent years and our Genetics Laboratory, under Dr. Myron Gordon, is almost exclusively concerned with the tumors occurring in Platyfish and Swordtails. From this work came four papers presented at the meeting of the American Association for Cancer Research in New York on April 11-13.

Dr. Nigrelli, the Aquarium pathologist, and Dr. Sophie Jakowska of the College of Mount St. Vincent described a tumor from an African Lungfish, of a type never before found in fishes. Dr. Gordon and Dr. Recai Ermin of the University of Istanbul reported on experiments comparing the regeneration of normal fish fins and those bearing melanotic tumors.

Dr. Nigrelli gave a paper on abnormal thyroid growths in marine fishes, of special interest because they demonstrate that an environmental lack of iodine is not always the cause of goitre-like growths, and Drs. Gordon and Berg and Miss Martha Edgar analyzed the development of thyroid tumors in one of the Genetics Laboratory's strains of Montezuma Swordtails; a tendency to develop this particular type of tumor seems to be inherited.

Dr. Gordon spoke on "The Influence of Heredity in Melanoma Development" at a symposium of fundamental cancer research in Houston on April 25-26.

This is one of the out-of-doors compartments at the Great Apes House, showing how it has been rebuilt so that there is a gradual descent to the shallow water at the bottom. All five compartments are rebuilt and in use now.

Garden Party Date: June 19

Announcements will be mailed in a few days of the program for the annual spring members' party at the Zoological Park. It will be held on Thursday, June 19, from 3 until 6:30 o'clock.

PUBLICATIONS OF INTEREST

AMPHIBIANS OF WESTERN NORTH AMERICA. By Robert C. Stebbins. Pp. xviii + 539, 64 pls., 35 text-figs. Published by University of California Press, Berkeley and Los Angeles, California, 1951. Price $7.50.

As a group, the amphibians have received less attention from past students of classification and natural history than the other vertebrate animals. Dr. Robert C. Stebbins, Curator of Herpetology at the University of California's Museum of Vertebrate Zoology, is one of an increasing number of specialists who are rapidly remedying this situation. The "Amphibians of Western North America" is a carefully written, attractively illustrated and fully documented account of all of the known species and subspecies of amphibians in western North America. The area covered by this work is "bounded on the south by the Mexican border, and on the east by the eastern boundaries of New Mexico, Colorado, Wyoming, Montana, and Saskatchewan and Mackenzie, Canada."

Keys are presented for the identification of adults, eggs, and larvae. The illustrations, all prepared by the author, depict the adults of each species and a few subspecies, many larval forms, the morphological features used in the keys, the geographic distribution of each form on a spot map, and photographs of representative habitats. Dr. Stebbins is the unusual combination of observant field naturalist, trained museum worker and skilled illustrator. The book profits handsomely from this combination of training and talents. – J.A.O.

ZOOLOGY IN POSTAGE STAMPS. By W. Dennis Way and O. D. Standen. 32 plates showing nearly 300 stamps in black and white. Philosophical Library, Inc., New York, 1952. $5.00.

Zoologists in general, it may be supposed, are less aware than philatelists that animals of all groups have often been figured, sometimes very beautifully, on the postage stamps of many countries. This little book is offered as a bridge between two interests which, while seemingly far apart, still have many points in common. There is real beauty in the "Pro Juventute" series of Switzerland and in the fishes of the 1951 issue of Mozambique.

Since the book is primarily philatelic, some major slips in zoological identities are to be expected. The "raccoon" of the Canal Zone is a coati, "gamecock" is a slip for the blackcock figured by Lichtenstein and the "Japanese fighting fish" are a very creditable pair of veil-tailed goldfish. But these small matters will detract little from the pleasure this book will give to many. – L.S.C.

New Members of the New York Zoological Society

(Between March 1 and April 30, 1952)

Life

Dr. Henry Clay Frick
George B. Gibbons
Joel S. Mitchell, Jr.

Contributing

Mrs. P. F. Brundage
Mrs. C. Reed Cary
Philip J. Costigan
William H. English, Jr.
Samuel A. Galpin
Miss Lois Manton Graff
Richard S. Goldman
Sheldon R. Green
Henry E. Hird
J. Duffield Prince
Mrs. Magda Merck Sheldon
Sanford G. Simmons
Mrs. David W. Smyth
Mrs. Isabel Kellers Tozzer
Dean K. Worcester

Annual

Mrs. A. Bakhmeteff
Mrs. Herbert Bandes
Jay M. Bartels
William J. Baxter
James C. Clark, Jr.
Richard L. English
Thomas W. Estes
Carl F. Farbach
Mrs. Edward J. Ferenz
Master Nelson Yarrow Foss
Jesse Freidin
R. Arthur Fulton
Joel Goldschmidt
Mrs. Ann C. Holmes
David K. Kadane
Grant Keehn
Miss Teresa Kilham
Mrs. Emil A. Kratovil
Dr. Jonathan T. Lanman
Bertram Liberman
David Oransky
Max J. Raphael
Dr. Milton Reisch
Miss Gloria Rooder
Miss Starr Rothchild
Fred Schlosser
Peter Sheldon
Dick Speyer
Mrs. Grace A. Van Alstyne
Joseph Walker
Mrs. Ann B. Wallin
Freeman F. Wallin
James W. Walsh, Jr.

ZOO REUNION 1952

ALL THE REUNIONS this June do not center around Nassau Hall, Morey's — or comparable sacrosanct spots!

One of the gayest takes place at the New York Zoological Park (Bronx Zoo) on June 19, 1952 at 3 o'clock in the afternoon.

This is a *different* kind of Reunion! Here the animals meet the Society members and the members meet the animals. Not only are old bonds strengthened but new ones are formed. Herbert the Walrus for instance (with us only since last fall) is the current threat as the Animal-Most-Likely-to-Succeed!

This is the time we like to make NEW friends

We hope *all* our members can come to the Park for the Animal Garden Party, June 19th — BUT, we also hope each one will bring a prospective member, someone who will enjoy the afternoon, and want to come again for many years ahead.

Please BRING A GUEST who might become interested in the Society's work — and *be sure* to let us have his or her name and address so that we may pursue him or her!

Just send the names to:

MEMBERSHIP COMMITTEE
New York Zoological Society
30 East 40th Street
New York 16, New York

JUN 6 1952